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Title: Early detection of non-native fishes using fish larvae

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Abstract: Our objective was to evaluate the use of fish larvae for early detection of non-native fishes, comparing traditional and molecular taxonomy approaches to investigate potential efficiencies. Fish larvae present an interesting opportunity for non-native fish early detection. First, as ichthyoplankton, fish larvae can function as propagules for non-native species introductions, and thus the capture of a novel species may indicate a first introduction. Second, because most Osteichthyan fishes (i.e., bony fishes) produce many eggs, if an introduced fish population is at the early stage of establishment, the larvae will be much more abundant than adults, and thus possibly more likely to encounter. Our approach was to intensively sample a Great Lakes non-native species introduction hotspot and then compare the success and efficiency of fish larvae taxonomic characterization between traditional taxonomy and community level DNA sequencing, a relatively novel molecular taxonomic method. We intensively sampled the Duluth-Superior harbor, the Great Lakes largest freshwater port, using a spatially balanced design to equally allocate catch effort across the harbor. To maximize the number of species encountered, we sampled at different time periods throughout the spring spawning period and used multiple types of sampling effort: diurnal tucker trawls, diurnal beach seining, nocturnal neuston tows, and nocturnal light traps. Success was measured as the sample-based probability of encountering a given non-native species. Efficiency was measured using species-area theory, as well as using comparative measures of effort required to yield a taxonomic characterization of the fish assemblage. We will present the results from our 2012 sampling effort, discuss the comparison between the two taxonomic approaches, and evaluate the performance of either approach compared to sampling juvenile and adult fish using traditional catch and identification methods.